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LAMINATED GLASS

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(57) Claim

1. A laminar glass assembly comprising two sheets of glass with a plastics film disposed between them, the plastics film being directly adhered to one of said glass sheets by a thin adhesive layer and to the other of said glass sheets by a layer of adhesive having structural properties and of substantial thickness compared to that of the film such as to provide structural reinforcement of the resultant laminate.

16. A laminar glass assembly comprising inner and outer sheets of annealed glass with a bi-laminate plastics film disposed between them, said film comprising two plastics laminae with an intermediate metallized solar control/

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Complete Specification for the invention entitled:

LAMINAR GLASS ASSEMBLIES

The following statement is a full description of this invention, including the best method of performing it known to applicant(s):

being directly adhered to one of said glass sheets by a thin adhesive layer and to the other of said glass sheets by a layer of adhesive having structural properties and of substantial thickness compared to that of the film such as to provide structural reinforcement of the resultant laminate.

The plastics film may be commercially available plastics film provided with a solar control/energy saving coating and an adhesive coating. The latter coating is preferably a pressure-sensitive adhesive although it may be of a type which is water activated before applying the film to the closely adjacent glass sheet. Such a plastics film is normally applied to the inner surface of a glass window, where it is susceptible to damage and prone to separation from the glass. When positioned between two sheets of glass in accordance with the invention it is protected against damage, and the tendency for separation from the glass is overcome.

The plastics film is preferably a polyester-based film, desirably a stretched polyester film as sold under the trade mark "Melinex", with the two adhesive layers both being polyester-compatible adhesives. As already mentioned one adhesive layer is preferably provided by a pre-coated pressure-sensitive adhesive and the structural, reinforcing adhesive layer is preferably a minimum two-component polyester-based resin with polyester-compatible adhesive properties and which can be applied to provide a layer of the desired thickness. Such a construction not only

between them. Such plastics films are commercially available with said layer being a metallized layer applied to one of the plastics sheets prior to lamination thereof, by a vacuum deposition or sputtering process. These films, employing polyester plastics sheets, have properties determined by the nature of the intermediate layer and its method of application. They are conveniently classified as either "low-E film" which has low emissivity and operates to retain heat within a building with which it is used, or "solar control film" which operates to keep the heat from sunlight out of the building. Thus a low-E film is in general used in cooler climates, and a solar control film in the sunnier and warmer climates.

When the plastics film is a solar control/energy saving film, conveniently of bi-laminate form, under high-intensity sunlight a considerable temperature rise can occur within the assembly of the invention, particularly on the outer side of the film. Thus the assembly should be installed in a building with the thicker adhesive, or resin in-fill, layer on the inner side of the plastics film. Furthermore, it is necessary to use a resin which is stable at the elevated temperatures involved, that is up to at least a temperature of the order of 100°F and preferably up to a temperature of 120°F.

According to another aspect of the invention, a laminar glass assembly comprises inner and outer sheets of annealed glass with a bi-laminate plastics film disposed between them, said film comprising two plastics laminae

reference to the accompanying diagrammatic drawings which illustrate, by way of example, a laminar glass assembly in accordance with the invention and a specific embodiment thereof. In the drawings:

Fig. 1 illustrates the assembly in edge view; and

Fig. 2 similarly illustrates the specific embodiment.

The assembly in accordance with the invention which is illustrated in Fig. 1 comprises two sheets 1 and 2 of annealed glass between which is disposed a plastics film 3. The film 3 is directly adhered to the glass sheet 2 by a thin layer 4 of a resin adhesive, which is of negligible thickness so that the film 3 is effectively directly bonded to the glass sheet 2. The film 3 is adhered to the glass sheet 1 through a thick layer of resin adhesive 5, the sheets 1 and 2 and the film 3 being disposed in parallel relationship.

For the film 3 a stretched polyester-based plastics is conveniently used, such as that sold under the trade mark "Melinex", and this may be pre-coated with a pressure-sensitive adhesive which provides the layer 4. During manufacture the adhesive-coated surface of the film 3 is applied to and pressed against the glass sheet 2 with full surface contact, and use of the pre-coated plastics film 3 facilitates machine application to the glass sheet 2. The layer 5, which is in-fill synthetic resin with

at both surfaces of the film 3 so that film separation does not occur.

The glass sheets 1 and 2 have a thickness within the range of 2 to 12 mm, the plastics film 3 has a thickness within the range of 1 to 10 thousandths of an inch (0.025 to 0.254 mm), and the resin layer 5 with polyester-compatible adhesive properties has a thickness within the range of 0.1 to 6.0 mm. If strength is not a major consideration a thinner plastics film 3 may be used, when the minimum thickness could be 1 thousandth of an inch (0.025 mm) or less.

In the specific embodiment of Fig. 2 the plastics film 3 is itself a bi-laminate a fragment of which is shown to a larger scale in inset view. This pre-laminated film 3 comprises two thin polyester sheets 3a and 3b with an intermediate solar control and/or energy saving metallic coating 3c which is applied to one of the sheets 3a and 3b prior to lamination thereof. The film 3 is of known form, being commercially available, with the coating 3c applied by a sputtering or vacuum deposition process, being of a nature and application to provide the desired solar control and/or energy saving properties.

When the assembly has solar control properties an elevated internal temperature is produced under incident sunlight, particularly on the outer side of the film 3. Thus the resin layer 5 is such as to be stable up to temperatures of the order of 100°F, and preferably up to 120°F and the assembly is installed in a building with the

The claims defining the invention are as follows:

1. A laminar glass assembly comprising two sheets of glass with a plastics film disposed between them, the plastics film being directly adhered to one of said glass sheets by a thin adhesive layer and to the other of said glass sheets by a layer of adhesive having structural properties and of substantial thickness compared to that of the film such as to provide structural reinforcement of the resultant laminate.

2. An assembly according to claim 1, wherein said plastics film has a solar control and/or energy saving coating and an adhesive coating on one side, both applied to the plastics film prior to incorporation in the assembly with the adhesive coating providing said direct adhesion of the film to said one glass sheet.

3. An assembly according to claim 2, wherein said adhesive coating comprises a pressure-sensitive adhesive.

4. An assembly according to claim 3, wherein said adhesive coating is of a type which is water activated before applying the film to said one glass sheet.

5. An assembly according to any one of the preceding claims, wherein said plastics film is a polyester-based film with said two adhesive layers both comprising

adhered to one of the sheets of glass by a thin layer of polyester-compatible adhesive and being attached to the other sheet of glass by a synthetic resin layer having structural and polyester-compatible adhesive properties and which is of substantial thickness as compared with the thickness of said plastics film whereby to provide reinforcement of the resultant laminate.

12. An assembly according to claim 11, wherein said plastics film is itself a laminate of two plastics sheet with a solar control and/or energy saving layer between them.

13. An assembly according to claim 1, wherein said solar control and/or energy saving layer is a metallized layer applied to one of said plastics sheets prior to lamination thereof.

14. An assembly according to claim 11, wherein said plastics film has solar control properties and said synthetic resin layer is stable up to a temperature at least of the order of 100°F (approx 38°C).

15. An assembly according to claim 14, wherein said synthetic resin layer is stable up to a temperature of 120°F.

16. A laminar glass assembly comprising inner and outer

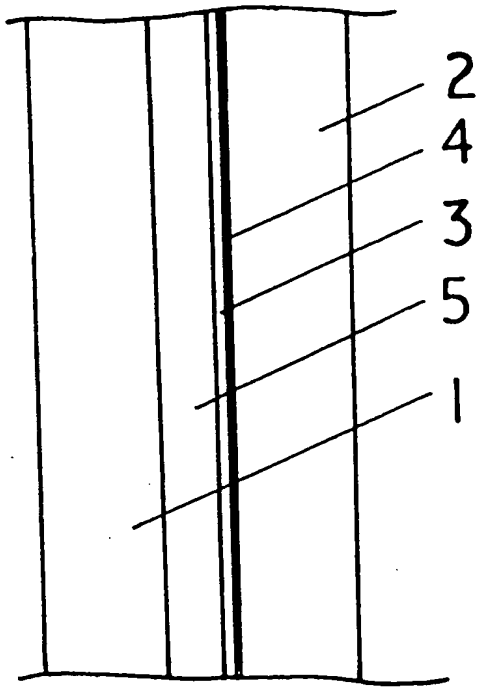

fig. 1

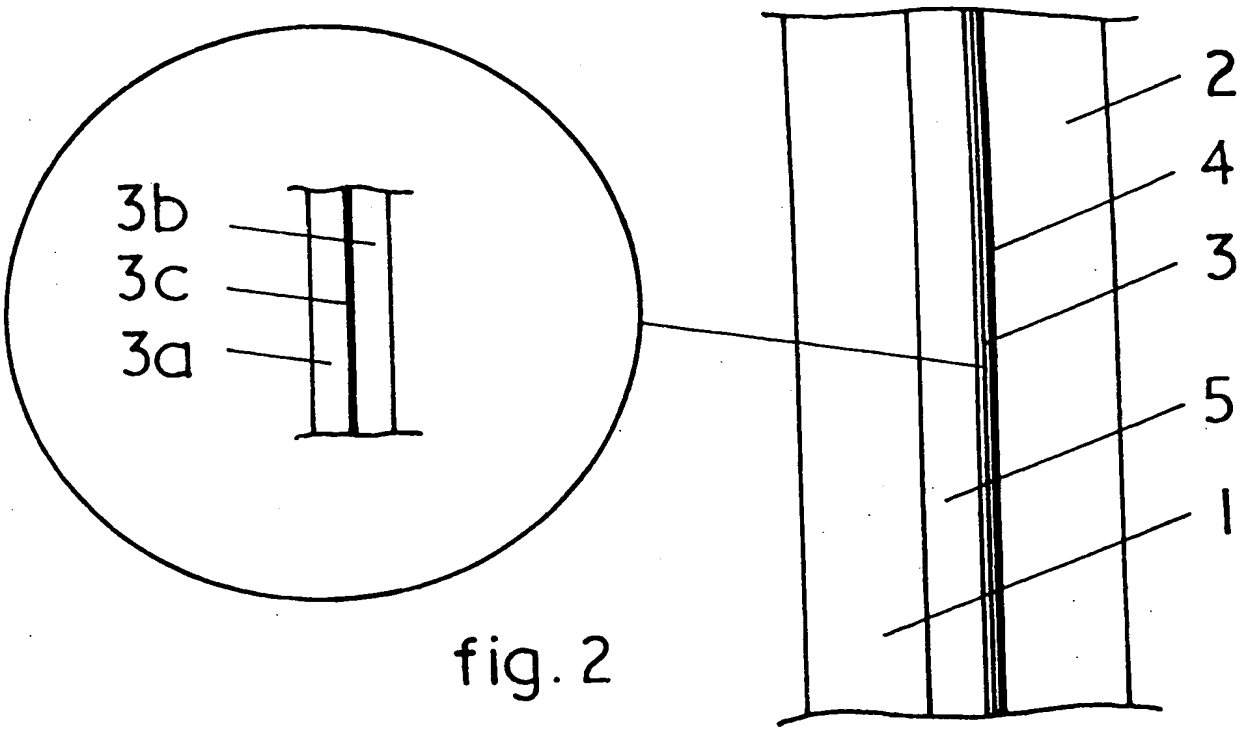

fig. 2